

12. Notes on the Tunicate *Rhizomolgula globularis* Pallas*.

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(Results of the Oxford University Expedition to Spitsbergen, 1921, No. 24.)

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(Plate I.)

Among the Tunicata collected by the Oxford University Expedition to Spitsbergen, and sent to the Natural History Museum for identification, were 26 specimens of the small sandy Simple Ascidian *Rhizomolgula globularis* Pallas. As the material is fairly well preserved, the writer believes a few anatomical notes may be of interest.

Description.—The specimens (Pl. I. fig. 1) are somewhat triangular in shape, and covered with fine sand; the largest are about 10 mm. high, not including the stem-like basal process, 10 mm. broad and 3 mm. thick. The two orifices, one at each end of a flat oval area, are usually barely discernible.

Oral tentacles (Pl. I. fig. 2): there are 8 large primaries, 8 secondary, 16 tertiary, and 32 quaternary, *i. e.* 64 in all. Primary tentacles sickle-shaped, compressed laterally.

Dorsal tubercle horseshoe-shaped with opening forwards and to the left.

Branchial folds six on each side, each with five inner longitudinal vessels.

Infundibula deep, with the long double spiral gill-clefts wound in the same direction; accessory gill-slits rather simple, commonly with a single curve nearly flat.

The hermaphrodite sexual gland in the loop of the intestine, the minute oblong kidney, and the paired peduncular secretory glands near the base of the endostyle, all on the left side excepting the right secretory gland.

Locality. Klaas Billen Bay, just above low-tide mark, *i. e.* exposed to the air at low tide; near by a line of large boulders close to the Nordenskiöld Glacier (*C. S. Elton*).

The history of the genus *Rhizomolgula* is interesting. It was founded by Ritter in 1891 for a new species of Molgulid from Prince William Sound, Alaska, 20 fms., *i. e.* outside the Arctic Circle. The generic characters were the existence of the peduncle, the presence of six folds on each side of the branchial sac, the deep infundibula with spiral gill-cleft, and the left-sided position of the intestines and hermaphrodite sex gland, and the

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presence of the peculiar glands supposed to be renal, one on each side of the posterior end of the endostyle. In 1903 Hartmeyer described a second new species, *R. ritteri*, from Baffin Bay, 20 fms.; the new species differed in having fewer inner longitudinal vessels, and in having accessory gill-clefts supposed to be absent in Ritter's species. Hartmeyer showed that the paired glands were not renal, but organs for supplying a secretion for fixing the animal to the bottom; the true renal organ was found by him to be a minute oblong body placed below the stomach.

In 1907-8 Redikorzev described two more new species, *R. gigantea* from Kotelnyi Id. and New Siberian Ids., 3-9 metres; and *R. warpachovskii* from Nova Zembla, 40 metres.

In 1908 Michaelsen added a further new species *R. intermedia*, based on some specimens found in the Hamburg Museum, and from an uncertain locality.

In 1911 Huntsman* made the interesting discovery that in 1776 Pallas† had described an undoubted *Rhizomolgula*, viz. *Ascidia globularis* from Kara Sea, and he identifies some specimens from Herschel Id., Canadian Arctic Ocean, with this species.

Lastly in 1916, Redikorzev‡ arrived at the conclusion that all the forms hitherto described belonged to one species, *Ascidia globularis* Pallas, the supposed specific differences being merely variations such as might be found in a large number of specimens from any particular locality; or, again, that certain variations in external appearance (especially as regards the peduncle) might be due to methods of collection and preservation.

The writer adopts Redikorzev's view with the reservation that a more detailed study of the oral tentacles might show genuine specific differences. The number of primary tentacles might be regarded as a specific character, but not the number of multiples of the primary number.

The specimens from Spitsbergen have eight primaries; but there appears to be some uncertainty concerning the number of primaries in the other supposed species [*R. arenaria*, 12-14 tentacles; *R. ritteri*, 12 large ones, also with smaller (about 18 in all); *R. warpachovskii*, 12; *R. gigantea*, 18 in three sizes; *R. intermedia*, 40 in three orders].

Distribution. Pallas's original *Ascidia globularis* was gathered in 1770 from Kara Bay, Kara Sea. Over 130 years later the same species (named *R. warpachovskii* Rdkrzv.) was got from Matochkin Strait, Nova Zembla, practically the same locality; for Nova Zembla curves round Kara Sea like a sickle separated from the mainland only by another island. The species is recorded also from New Siberia and from two American Arctic

* Trans. Canadian Inst. 1911-21, ix. p. 127; also Contrib. Canadian Biology, Ottawa, 1912, p. 136.

† Reise, 1776, iii. p. 709, Appendix; and Nova Acta Acad. Petropol. 1787, ii. p. 247, Tab. vii. figs. 39, 40.

‡ Faune de la Russie et des pays limitrophes, 1916. Tunicata, livr. i. pp. 126-137.

localities (Baffin Bay and Herschel Id.), all within the Arctic Circle; and from a place in Alaska outside that circle. The material from Spitsbergen fills in a gap in the circumpolar distribution.

Depth. Shallow water to 40 metres.

There are present in all the examples examined numerous specimens of a species of parasitic protozoa of the group *Suctorio* with a globular sessile body 0.5 to 0.1 mm. in diameter and with one or more tufts of granular slender, vase-shaped tentacles (Pl. I. figs. 2-4, 9, 10).

When the Ascidian is cut in half transversely and the front half turned back, the *Suctorio* appear—under a lens—like snow-balls scattered over the tentacles (fig. 2). They are distributed over the anterior aspect of the tentacles and front wall of the peripharyngeal groove, and never on the posterior wall or the area behind it; they are especially abundant near the upper end of the endostyle and dorsal lamina. This curious distribution led the writer into mistaking the *Suctorio* for sensory organs of the Ascidian, and he has to thank Dr. W. T. Calman for suggesting that the “knobs” were probably parasitic Protozoa.

In 1894 Dr. R. Gottschaldt (Jenaische Zeitsch. Bd. xxviii. p. 343) described and figured *Suctorio* found behind the tentacles of the Ascidians *Polyclinopsis haeckeli* Gottsch. and *Synoicum turgens* Phipps from Spitsbergen. The Suctorian figured by Gottschaldt differs from the present one in having knobbed tentacles. Dr. Gottschaldt regards his species as symbiotic rather than parasitic, because the remains at least of the sucked-out Protozoa brought to the Ascidian fall to the lot of the latter; whereas some of the ciliated Infusoria might, in the absence of the *Suctorio*, have escaped altogether.

EXPLANATION OF PLATE I.

Figures of *Rhizomolgula globularis* (Pallas).

- Fig. 1. A rather large specimen. Nat. size.
- Fig. 2. Anterior part reversed, of a specimen cut across transversely, showing the posterior aspect of the tentacles. *T*¹, primary tentacles; *T*¹¹, secondary; *M*, mouth; *At*, atrial opening; *P*, peripharyngeal bands and groove; *dt*, dorsal tubercle; *dl*, dorsal lamina; *En*, endostyle; *f*, folds of branchial sac; *bs*, cut edge of branchial sac. $\times 10$.
- Fig. 3. Groups of *Suctorio* on or near the anterior peripharyngeal band, near the end of the endostyle. *En*, endostyle; *P'*, posterior pharyngeal band; *P''*, anterior ditto; *Tyl*, the knob-like *Suctorio*. $\times 18$.
- Fig. 4. Group of *Suctorio* in epibranchial area near dorsal tubercle, *dt*. $\times 18$.
- Fig. 5. Part of tentacular ring and tentacles of four orders (mainly diagrammatic). $\times 30$.
- Fig. 6. Primary tentacle, antero-lateral aspect. $\times 60$.
- Fig. 7. Primary tentacle, posterior aspect. Partly diagrammatic. $\times 40$.
- Fig. 8. Primary tentacle, anterior aspect. Partly diagrammatic. $\times 40$.
- Fig. 9. A Suctorian, with a nearly central nucleus-like body, and one tuft of sensory hairs. $\times 280$.
- Fig. 10. Part of a Suctorian. $\times 1400$.